Policy on Utilization of Taiwan Deep Ocean Water Resources and Industry-Drive Strategy

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Abstract

According to the American and Japan DOW experience, the opportunity of the Taiwan DOW industry is infinite. However, the government must play the role in manager and supervisor to avoid some poor enterprise in producing low-quality products. Besides, the government should give assistance to the DOW industry and integrate the power of government and non-government circle.

Hence, Water Resource Agency (WRA) especially drafts the “DOW resource development policy program” to the Executive Yuan, and this draft puts into practice in April 12th, 2005. The Councils for Economic Planning and Development (CEPD) also arrange the “DOW resource utility and industry development advance team” to push, coordinate and discuss all the details between department, agency and legal person. At the same time, the Council of Agriculture (COA), National Science Council (NSC) and Ministry of Economic Affairs (MOEA) also propose the “DOW resources utility and industry development plan” to be the guideline of the future work. This plan has decided by the Executive Yuan in January 23rd, 2006.

WRA has already established the secretariat to handle the related staff-member tasks. In order to accelerate and strengthen the DOW industry chain, WRA set up the “DOW resource technology development research center”. This center will expend the DOW technology greatly and provide the panel of technical exchange and technical guidance. In order to reduce the investment risk, WRA will carry out the investigation and research during the sea area. Simultaneously, WRA will give assistance to local government and prepare the DOW staff foster plan well to push the DOW business forward.

Keywords: Deep Ocean Water, DOW resources utility and industry development plan

1. Introduction

With the influence from international sagging economic development, homogenization of product that causes pricing competition and the open policy to draw foreign investment practiced by Mainland China that makes a transfer of domestic industry and capitals to this country, the economic downturn still prevails in Taiwan that result in high unemployment rate. In face of such aggravating challenge, Executive Yuan has launched “Challenge 2008: National Development Plan.” To expedite the perspectives of national construction, “Green Silicon Island,” the “Local Action” set forth in the basic strategy “Globalized Link, Local Action” signifies a good use of some niches existed in Taiwan, such as its diversified
geographical environment and multiple humanistic traits, in the hopes of creating the competitive advantages for this country. A mountainous island surrounded by ocean, Taiwan is rich in ocean resources with its unique geographical condition in the eastern coast of Taiwan featuring the narrow continental shelf with the water depth of above 1000m in waters and black tides flowing through (Fig. 1) that creates a potential for developing “Deep Ocean Water Industry” (DOW Industry)

In the light of US and Japan’s successful R&D and effective promotion of deep ocean water, Taiwan government has launched related researches into the utilization of deep ocean water resources since 2000, driving the strategic and technical development of “DOW Industry” based on the center of emphasis on industrial policy, technology, and system services. In the respect of private enterprises, numerous dealers in Hualien and Taitung have initiated to draw up the planning and development of industrial park concerning the DOW industry, thus apparently proving the government or private enterprises’ in-depth understanding of the value and prospects of DOW industry.

During the conference held on May 21, 2004 attended by Prime Minister and six industrial and business groups, moreover, advice concerning Taiwan’s expedient development of DOW industry was advanced by Chinese National Federation of Industries. Conclusions from the conference further designated MOEA to draw up plans in driving the development of DOW industry and establishment of DOW Biotechnology Park. In an expectation of the overall promotion of development and utilization of deep ocean water resources, WR of MOEA drew up “Guidelines for Policy on Utilization and Industrial Development of DOW Resources” (hereinafter called “Guidelines for DOW Policy”) which was presented to Executive Yuan and approved to be carried out on April 12, 2005.”

CEPD of Executive Yuan further formed “Inter-Department-based Promotion Team on Utilization and Industrial Development of DOW Resources” to drive, coordinate and review the plans of implementation and integrated items by each department in action and institution or corporate person. Under the approved Guidelines for DOW Policy, COA of Executive Yuan, NSC and MOEA also drew up the “Plan of Implementation on Utilization and Industrial Development of DOW Resources” (hereinafter called “plan of implementation”) as the policy guideline for Taiwan’s future development of DOW industry, and this plan was further approved by Executive Yuan on Jan. 23, 2006.

Contents and spirit of Guidelines for DOW Policy, anticipated plans of implementation 2006-2009 driven by MOEA, and the status quo of implementation for each governmental and non-governmental unit are to be given in following paragraphs.

Fig. 1  Topography in the Vicinity of Waters of Taiwan
(Source of Data: National Center for Ocean Research)
2. Background

2.1 Characteristics of deep ocean water

Deep ocean water, when mentioned here, refers to the sea water below the thermocline (more than 200 meters below the sea level) inaccessible to sunlight. The deep ocean water is, therefore, characterized by low temperature (6~9°C as surveyed in waters around Taiwan), being enriched with mineral, nutritious, crystal-clear, clean, with extremely few pathogen. Deep ocean water is an optimal choice for desalting, production of drinking water, aquafarming, food processing, salt production, production of tonic products, pharmaceutical manufacturing, water therapy, manufacture of cosmetic water and such multipurpose industries. Taking deep ocean water as the raw materials and using the up-to-date high technology to reinforce the conventional know-how, we can create remarkable added value. It is known as the newly developed water resources. This industry brings up innovating benefits or potential of growth and is supposed to bring up added jobs, renovate conventional industries, balance local economy and boost international competitive edge. The Water Resources Agency, Ministry of Economic Affairs and Taitung County Government have, therefore, respectively consigned scholars and experts to proceed with research programs. Those consigned scholars and experts have through exceptional efforts collected huge amounts of information and data from domestic and foreign sources. They conclude that the east coast of Taiwan, in the Continental Rim, takes advantage of the geographical benefits. The east part of Taiwan commands superior deep ocean water resources.

2.2 Status quo and output values of deep ocean water utilized in other countries

In Japan and the United States, they have primarily used deep ocean water for aquafarming. Such deep ocean water resources are, nevertheless, subject to restriction in economy and geographical region. The deep ocean water could only “locally replace” the surface ocean water. In the aquafarming, they have concentrated the use for breeding the high priced fish and shell fries and a small quantity of fish feeding. The deep ocean water has been commercialized in a variety of products, notably including Japanese sake and alcoholic products (beer, foaming alcohol), cosmetics, beverage, a variety of foods. In a great majority of the cases, they make adequate use of deep ocean water for economic purposes and the multipurpose utilization so deriving therefrom. Amidst the relatively too high economic factors, deep ocean water could only “partially replace” the existent products of the same categories.

Deep ocean water is primarily used in two categories: Direct utilization of the deep ocean water in the unprocessed water, taking advantage of its physical and chemical property, and the unprocessed water through division for commercialized use. The use of unprocessed deep ocean water still accounts for a great majority, say, over 90% Japan in use of unprocessed deep ocean water for aquafarming industry, and as high as approximately 99% for use of unprocessed deep ocean water in aquafarming industry, Hawaii. Japan, nevertheless, further maximizes the downstream deep ocean water. In the downstream related industries, Japan yielded nearly 600 billion Japanese yen in 2003,
including approximately 550 billion Japanese yen in beer and foam alcohol. In Kume Island, they are using deep ocean water for low temperature vegetables and fruits. In Hawaii, the Natural Energy Experiment Administrative (known as NELHA in initiative) yielded NT$40 million (equivalent to approximately NT$1.36 billion) output value in 2002. In Cyanotech Corporation, an auxiliary of NELHA, yields approximately NT$15 million annual worth (equivalent to approximately NT$500 million) in algae to be refined into nutrition, aquafarming bait and such downstream industries. The downstream industry of deep ocean water uses very low ratio of unprocessed deep ocean water but significantly boosts the local economy, creating tremendous value. South Korea is upbeat toward such promising industry as well.

2.3 Status quo and output values of deep ocean water utilized in Taiwan

According to the research concerning status quo of application and anticipated productive value for domestic deep ocean water advanced by Energy and Resources Laboratories (ERL) of Industrial Technology Research Institute (ITRI), some research units, local governments and private enterprises show intention to engage in the development and operation of DOW industrial park or water drawing/water supply undertaking in an attempt of booming the local industries or elevating the value of self-owned land use effectively.

Among those prospects, Yilan County Government has accomplished the “The Preliminary Planning of Feasibility for Use of Nan Ao DOW” as this project will set to draw deep ocean water from offshore waters of Nan Ao and plan to set hand in issues concerning the development of the industrial park, while the current phase of this plan will be centered on the implementation of BOT project. Integrating the private economic force, Taitung County Government has committed to seeking investment from private enterprises and the “Major Facility and Ancillary Enterprises of DOW Tourism and Recreation Development” and “Major Industrial Facility and Ancillary Enterprises of DOW”, both BOT projects, are underway to advertise for investments in public. Taiwan Fertilizer Company Limited, Lucky Cement Corporation and Kung Long Enterprise Co., Ltd. in Hualien County have already engaged in the development of deep ocean water-drawing facilities and further brought out successful cases.

Utilization of deep ocean water includes two methods: The first is small-scale food and drink importers who, through consolidated containers via Japanese wholesalers, import small volume of deep ocean water concentrated salt water, deep ocean water desalted packaged water, desalted mineral concentrated water and such deep ocean water products. In the second category, importers import deep ocean water and directly market it to downstream processors. Overall, in Taiwan, there is not yet a deep ocean water industry up to the reasonable shape. Relevant research programs in Taiwan indicate that in the future, the annual deep ocean water output value will be over NT$18 billion. In Taiwan, deep ocean water can be utilized to effectively upgrade the beverage industry, sea water aquafarming industry and the end output values of shell fries the output values of which range from NT$12.4 billion to NT$12.8 billion. With the two preceding items inclusive, the annual growth will be around NT$2 billion to NT$2.1 billion. The sea water aquafarming industry will be the prime beneficiaries. In the refined temperature control agriculture, Japan has used deep ocean water to develop low temperature vegetables and
fruits at Kumejima. In Taiwan, they have successfully developed low temperature floral industry in central Taiwan. The official statistics revealed by Council of Agriculture indicate that the flowers of six major species yielded NT$2.209 billion output value in 2003. The temperature controlled refined agriculture is promising in this regard and is supposed to replace high elevation cold area vegetable if the technology & know-how as well as promotion prove successful. There must be tremendous intangible benefits and the value in reducing the high elevation agriculture.

3. The up-, mid- and down-stream frameworks of deep ocean water industry in Taiwan

The up-, mid- and down-stream frameworks of deep ocean water industry is illustrated in Fig. 2. In the upstream end, the developers take the initiative to invest human resources, land, capital and such resources. They team up with non-government sectors in engineering, equipment, technology & know-how and consultation. They complete the seawater acquirement facilities, industrial zone development for water acquirement and supply to form the upstream industry of deep ocean water.

The mid-stream of deep ocean water industry is units in charge of management, primarily in charge of water division technology & know-how, equipment, pricing for the downstream users, review for application for water use, management of water distribution. They provide unprocessed deep ocean water to the R&D units to carry out infrastructural research on characteristics of deep ocean water, including aquafarming in breeding, temperature controlled agricultural R&D, medical pharmaceutical R&D, water division equipment and desalting technology & know-how and end utilization. Manufacture and R&D for a variety of commodities in the areas.

The downstream deep ocean water industry is classified into two categories, including agriculture and fishery with unprocessed deep ocean water, and industries that use water for commercialized utilization after division of the water. The downstream deep ocean water industry accounts for the major water consumption, including breed cultivation, seedling cultivation, algae cultivation, fishery and shell farming, low temperature vegetables, low temperature flowers and the like. Besides, there are commercialized water utilization industry, including beverage, a variety of food industries, alcohol, cosmetics, medicines, beach industry/seawater therapy and other applied industries which are being developed.

4. Guidelines for Policy on Utilization and Industrial Development of DOW Resources

4.1 Objectives

(1) Maximize the use of deep ocean water resources available in east Taiwan to balance the development on the island.

(2) Provide superior climate for investment to help the industries rooted in Taiwan.

(3) Support deep ocean water related industries and create added jobs.
(4) Develop deep ocean water utilization technology & know-how and upgrade the industries for competitive edge in the international community.

(5) Boost conventional industries for the added values to enhance economic growth of the nation.

4.2 Principles

(1) Carry out the “Project to National Aquafarming Resources Bank--Taitung Branch Bank”, build deep ocean water pumping and utilization facilities, set up aquafarming and research centers for fishery and agricultural incubation, proceed with trial and research for agricultural and fishery utilization, provide part of the
unprocessed deep ocean water for agriculture, industry, fishery related R&D and, in turn, promote such to east Taiwan that is characterized vast territories.

(2) The government will provide sound and comprehensive policies, laws and regulations concerned, fundamental research, incentive measures and such administrative support. Meanwhile, the government will help non-government sector to invest and set up deep ocean water parks as well as water acquirement and supply facilities.

(3) All sectors concerned will put forth wholehearted effort to carry out incubation, innovation for utilization of deep ocean water; carry out accreditation of products and boost marketing of the products to domestic and foreign lands.

(4) The government will carry out surveys on deep ocean water current, tidal science, water quality and temperature, and, on a regular basis, have the aforementioned information covered into the annual reports or relevant reports to all walks of life as handy reference.

4.3 Strategies

(1) Break through the administrative barriers through unification of powers

The multipurpose deep ocean water industry is a sort of newly emerged line and calls for many administrative support in laws and regulations concerned, land affairs and administration before it can go ahead without a hitch. To have such newly emerged industry take shape as soon as possible, the government is advised to set up a Promotion Panel. The members of the Deep Ocean Water Promotion Panel will come from all departments, involving very broad ranges. The Council of Economic Planning & Development (CEPD) of the Executive Yuan (the Cabinet) will, therefore, set up such Panel to carry out promotion and coordination on a unitary basis in package. When the deep ocean water industry becomes ripe, the relevant fundamental research and technological technology & know-how will soon take shape. By then, the Panel may quit in the wake of the success.

(2) Promotion for setup of the deep ocean water park or establishment of water acquirement and supply facilities

The east coast of Taiwan is optimal for deep ocean water development. Based on the availability of the hinterlands required for transportation need, length for water acquirement and the restriction on development for relevant industries, after the sites for development become final, the method of utilization will be determined based on the characteristics of the plant sites. The deep ocean water parks and the water supply facilities will be set up.

The deep ocean water park or water acquirement and supply facilities will be developed in the model where the government and non-government sector will go ahead hand-in-hand in synch. In the government sector, the Council of Agriculture of the Executive Yuan (the Cabinet) started implementation of the “Project to National Aquafarming Resources Bank--Taitung Branch Bank” in 2006 with efforts to pump and utilize the deep ocean water, set up incubation center or research center in the vicinity, provide part of the deep ocean water resources to the agricultural, industrial, fishery sectors
for fundamental research and technology application. The non-government sector, on the other hand, are encouraged to participate in public construction and investment, or simply invest directly so that the non-government sector will take the initiative to carry out the development, solicit investors and operate the facilities. Meanwhile, the government tries by all available means in laws, development procedures, infrastructures and land acquirement.

(3) Promotion of infrastructural research on the characteristics of deep ocean water, and the technological R&D

The high-rise building industry lays the foundation on deep ocean water which differs from surface ocean water in low temperature, nutrition, cleanliness and such multiple characteristics. These characteristics is closely linked up with the oceanic geology, physics, chemistry and biology. In industrial utilization, these characteristics will be utilized for manufacture and services. For that, we must look into and make sure of the deep ocean water functions before we can successfully develop it. The government is, therefore, advised to provide the resources of infrastructural research to launch research on the deep ocean water functions. Meanwhile, the non-government sector is advised to launch R&D on the manufacturing technology & know-how and originality of the new commodities. Through the concerted efforts, the fruits of the infrastructural research on deep ocean water characteristics will be effectively converted into commodities of marketable values.

(4) Setup of inspection and accreditation systems to thwart counterfeits or substandard counterparts

The deep ocean water related products offer attractive added values. Very inevitably, therefore, they will lure some unscrupulous merchants to counterfeit them. The government should, therefore, promote inspection and accreditation systems for deep ocean water utilization and set up verification systems for standard deep ocean water products. All these efforts are advised and necessary to prevent any unsound impact upon the deep ocean water industry from the rosy prospect.

(5) Incubation, innovation guidance and support of development of markets

As a newly emerged industry, deep ocean water industry can be invested from many relevant conventional lines through transformation. Very often, it will run into problems in technological upgrade and educational & training programs for high-caliber talents. In some other cases, quite a few well eligible investors might be unable to fulfill their dream because of lack of working capital and management know-how. The deep ocean water incubation and innovation industry would become especially important. In the initial phase, the government and the industry will team up with each other hand-in-hand to carry out the incubation and innovation to provide services in investment guide, transformation and educational & training programs. When the entire industry takes shape, the government may decide whether it should continue the efforts as the actual requirements may justify.

Throughout the world, sites optimal for deep ocean water development are hardly available. In market development at home or abroad and in marketing, the government
may help the industry carry out exhibition and publicity. Besides, more importantly, taking advantage of the resources of the overseas representative offices of the Republic of China, the government may help the industry develop deep ocean water markets in various countries.

(6) Review and update of the laws and regulations concerned and encouragement with preferential terms to help deep ocean water industry develop

For development and operation of deep ocean water parks, there have been quite sound and comprehensive laws and regulations concerned available. To put it in more understandable terms, the deep ocean water industry sees no significant barriers. The pilot facilities for deep ocean water might, nevertheless, inevitably impact upon the environment and landscape. Where deep ocean water is a newly emerged industry, the current Law for Promotion of Private Participation in Infrastructure Projects and Statute for Industrial Upgrade Package might be inevitably insufficient in taxation favors and soft loans. To ensure a sounder background for development, all those laws and regulations concerned should be reviewed and duly updated into a sharp tool to help deep ocean water industry grow at a sound pace.

4.4 Project of Enforcement

(1) Setup of “Cross-Ministry Deep Ocean Water Resource Utilization and Industrial Development Promotion Panel”

a. The Council of Economic Planning & Development (CEPD), Executive Yuan (the Cabinet) will set up the “Cross-Ministry Deep Ocean Water Resource Utilization and Industrial Development Promotion Panel”, and Water Resources Agency, Ministry of Economic Affairs will carry out the bureaucratic operation.

b. The Panel shall be made up of the business, academic and government celebrities and representatives from all walks of life. In the government, the Panel members shall cover the Ministry of the Interior, Ministry of Transportation & Communications, Ministry of Economic Affairs, Council of Agriculture, National Science Council, Environmental Protection Administration (EPA), Department of Health of the Executive Yuan alongside the local level governments.

(2) Setup of the deep ocean water park or water acquirement and supply facilities

a. Launch survey and research on the fundamental particulars for the oceanic characteristics of the prospective sites.

b. The Council of Agriculture of the Executive Yuan enforces the “Project to National Aquafarming Resources Bank--Taitung Branch Bank” in 2006, providing partially the unprocessed deep ocean water for fundamental research and application.

c. Help coordinate for the development sites and the relevant issues.

d. Help acquire the development sites.

e. Help develop the public facilities (equipment), peripheral infrastructural
facilities.

f. Help the deep ocean water park in operation and management.

(3) Promotion of the infrastructural research on characteristics of deep ocean water and industrial technology & know-how

a. Put forth wholehearted effort to carry out the infrastructural R&D on development and utilization of deep ocean water resources.

b. Help industries carry out R&D on deep ocean water development and utilization.

c. Strengthen market survey of deep ocean water and research of application.

(4) Setup inspection and accreditation systems to thwart substandard and counterfeiting products

a. Beef up the R&D of the technology & know-how on deep ocean water utilization, inspection and accreditation.

b. Establishment of the technology & know-how on deep ocean water accreditation.

(5) Support in incubation and innovation, support for development of the markets

a. Implementation of the “Project to National Aquafarming Resources Bank--Taitung Branch Bank” by setting up agricultural, fishery application research centers in the vicinity, strengthening the R&D on algae and aquafarming products, fries, doing R&D on technology & know-how of fish farming with research on feasibility for low temperature vegetables, flowers.

b. Carry out with wholehearted efforts support in incubation and innovation of deep ocean water utilization.

c. Carry out with wholehearted efforts promotion and marketing of deep ocean water products.

(6) Review of updating laws and regulations concerned, incentive measures in favor of the development for the deep ocean water industry

a. Setup of standard criteria for application for pilot projects.

b. Review of “Law for Promotion of Private Participation in Infrastructure Projects” to have it covering the items for deep ocean water development to lure non-government sector into the projects.

c. Review of “Statute for Industrial Upgrade Package” and such laws and regulations concerned to cover deep ocean water industry to provide preferential terms in taxation, financing and the like.

(7) Enforcement of division of labor and the scheduling


b. The duration of Phase II will be duly fixed dependent upon the performance of Phase I. The Ministry of Economic Affairs assembled the enforcement plans
from all ministries concerned and submitted them to the Executive Yuan in Phase I, 2005. All ministries concerned will launch sound division of labor with the retrospective budgeting to facilitate the launch in 2006. The division of labor of various ministries is enumerated below.

5. Plan of Implementation on Utilization and Industrial Development of DOW Resources, MOEA

5.1 To Drive the Division

The project “Guidelines for Policy on Utilization and Industrial Development of DOW Resources” covers six strategies, among which the tasks of division driven by MOEA and its subordinated institutions are:

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Main (Assistant) Organizing Institution</th>
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<tbody>
<tr>
<td>Stff operation of “Inter-Department-based Promotion Team on Utilization and Industrial Development of DOW Resources”</td>
<td>WRA (Industrial Development Bureau, Department of Industrial Technology)</td>
</tr>
<tr>
<td>Survey and research into special traits of waters in potential sites</td>
<td>WRA (Industrial Development Bureau, Department of Industrial Technology)</td>
</tr>
<tr>
<td>Assist the industry in conducting the research into development and utilization of deep water sources</td>
<td>Department of Industrial Technology (Industrial Development Bureau, WRA)</td>
</tr>
<tr>
<td>Enact norms governing the water diversion construction</td>
<td>WRA</td>
</tr>
<tr>
<td>Market survey of DOW industry and research of its application</td>
<td>Industrial Development Bureau, Department of Industrial Technology</td>
</tr>
<tr>
<td>Incubation and innovative assistance of DOW industry</td>
<td>Department of Industrial Technology, Small &amp; Medium Enterprise Administration (WRA)</td>
</tr>
<tr>
<td>Review of amendment of regulations, incentive and promotional measures, and nurture industrial development</td>
<td>Industrial Development Bureau</td>
</tr>
<tr>
<td>R&amp;D and system for inspection accreditation technology of deep ocean water</td>
<td>Bureau of Standards, Metrology and Inspection (Department of Industrial Technology)</td>
</tr>
<tr>
<td>Assistance in marketing of deep ocean water products</td>
<td>Bureau of Trade, Small &amp; Medium Enterprise Administration, Industrial Development Bureau</td>
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5.2 Structure of Function

Based on Guidelines for Policy on Utilization and Industrial Development of DOW Resources approved by MOEA, the division of tasks concerning deep ocean water by
upstream, midstream and downstream industries involves in basic function structure of our integral project, as indicated in Fig. 3.

Fig. 3  Block Diagram of Function for Plan of Implementation on Utilization and Industrial Development of DOW Resources by MOEA

As indicated by Diagram 3, Department of Industrial Technology will undertake to the role of core key technical R&D by making use of the existing research of service-based technology project under this department and research system of technology project under the industry of its kind to achieve the demand on DOW industrial service model and development of key technology for products in the industry. To be responsible for driving the technology development for DOW resources and assisting in the setup of water resource industry, WRA will be in charge of surveying the DOW resources and establishing the data of characteristics, integration of regional development industry, application technology R&D, and service promotion; Industrial Development Bureau will undertake to assisting the industry in carrying out product R&D, helping Bureau of Standards,
Metrology and Inspection (BSMI) establish quality accreditation system, and review the amendment of regulations, incentive and promotional measures and nurture industrial development to advance the industrial development; Small & Medium Enterprise Administration (SMEA) will play a role of the assistance in industrial incubation; Bureau of Trade will be in charge of assisting in the product marketing; BSMI will be undertaking to establishing the inspection technology, standard and accreditation system for deep ocean water to thwart counterfeits or substandard counterparts.

5.3 Plan of Implementation

According to five objectives, four principles, and six strategies under “Guidelines for Policy on Utilization and Industrial Development of DOW Resources”, MOEA has enacted the related plans of implementation, and the schemes of implementation cover the following items:

<table>
<thead>
<tr>
<th>Staff operation of “Inter-Department-based Promotion Team on Utilization and Industrial Development of DOW Resources” (WRA)</th>
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<tbody>
<tr>
<td>Investigation and research into the special traits of waters in potential sites (WRA)</td>
</tr>
<tr>
<td>Assist the industry in conducting the development, utilization and R&amp;D of DOW Assist deep ocean water industry in carrying out the technical R&amp;D (technology project) (Department of Industrial Technology)</td>
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<tr>
<td>R&amp;D of water division and desalination technology and establishment of database for characteristics of deep ocean water in Hualien area (Department of Industrial Technology)</td>
</tr>
<tr>
<td>Technology application of deep ocean water and beverage/food addition industry (Department of Industrial Technology)</td>
</tr>
<tr>
<td>Setup of “Research Center for Technology Development of DOW Resources” (WRA)</td>
</tr>
<tr>
<td>Assist in developing the DOW-processed products (Industrial Development Bureau)</td>
</tr>
<tr>
<td>Market survey of DOW industry and its application research Drive the technology project for DOW system service (Department of Industrial Technology)</td>
</tr>
<tr>
<td>Market survey and planning for value added innovation application of DOW product (Department of Industrial Technology)</td>
</tr>
<tr>
<td>Planning for value added innovation application (Department of Industrial Technology)</td>
</tr>
<tr>
<td>Integrated application of DOW products and tourism and leisure industry (Department of Industrial Technology)</td>
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<tr>
<td>Utilization of cold energy of DOW (Bureau of Energy)</td>
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<tr>
<td>“New Engineering R&amp;D Mold Factory for Low-Temperature Utilization of DOW and Water-drawing Insulation” (MOEA)</td>
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<tr>
<td>Incubation and innovative assistance of DOW industry Assist the DOW industry in technical R&amp;D (technology project) (Department of Industrial Technology)</td>
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<tr>
<td>Assist the residence of incubation center into enterprise (SMEA)</td>
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<tr>
<td>Promote the propaganda on development and utilization of DOW resource schemes (SMEA)</td>
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<tr>
<td>Assist incubating enterprises in attending seminar on DOW-related knowledge and exhibit and sale of DOW-related product (SMEA)</td>
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<td>Task</td>
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<td>---------------------------------------------------------------------</td>
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<tr>
<td>Train and educate professionals demanded by DOW industry (WRA)</td>
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<tr>
<td>Assist the local governments in expediting the promotion of DOW industry (WRA)</td>
</tr>
<tr>
<td>Review the amendment of regulations, incentive and promotional measures, and nurture industrial development (Industrial Development Bureau)</td>
</tr>
<tr>
<td>R&amp;D of inspection technology for DOW and the establishment of system Enact the DOW standards (BSMI)</td>
</tr>
<tr>
<td>Establish inspection technology for DOW (BSMI)</td>
</tr>
<tr>
<td>Establish accreditation system for DOW (BSMI)</td>
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<tr>
<td>Assist in marketing for DOW products Promotional advertising for products (Bureau of Trade)</td>
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<tr>
<td>Attend domestic and overseas foods exhibits and form trading delegates (Bureau of Trade)</td>
</tr>
<tr>
<td>Set up network marketing platform (Bureau of Trade)</td>
</tr>
<tr>
<td>Promote “project on sale expansion of chain store channels” to assist manufacturers in tapping overseas markets (Bureau of Trade)</td>
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<tr>
<td>Assist manufacturers in applying GMP accreditation for DOW-related products and the promotion of marketing (Industrial Development Bureau)</td>
</tr>
<tr>
<td>Assist turnkey dealers in promoting the product marketing (SMEA)</td>
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### 6. Conditions of Promotion

(1) To promote utilization and industrial development of DOW resources, “Inter-Department-based Promotion Team on Utilization and Industrial Development of DOW Resources,” established by CEPD under Article 1 of implementation schemes to “Guidelines for Policy on Utilization and Industrial Development of DOW Resources” approved by Executive Yuan, has planned the infrastructure and enacted coordinating issues. Deputy Chairman of CEPD is designated as the convener of this team, and the organizational chart is indicated in Diagram 4. The first conference was held in CEPD on Sept. 16, 2005, during which each department and local governments were asked to strengthen the enactment according to the contents of 2006-2009 Phase 1 implementation plan, while the evaluation and supervision to each unit on the plan implementation will be carried out. Missions of the team are:

- a. Promote the propaganda and related research into utilization and industrial development of DOW resources.
- b. Promote, coordinate and canvass the implementation plans by each department and institution in action or corporate person.
- c. Coordinate the items in need of integration between each department and institution in action.
- d. Review, revise and assist to schemes concerning utilization and industrial development of DOW resources for each department and institution in action.
e. Conduct negotiation of raising expenditures.

f. Manage tasks assigned by Executive Yuan.

Fig. 4 Organizational Chart of Inter-Department-based Promotion Team on Utilization and Industrial Development of Deep Ocean Water Resources

(2) WRA of MOEA has set up secretariat for Inter-Department-based Promotion Team on Utilization of DOW Resources in charge of assisting CEPD in organizing “Conference on Inter-Department-based Promotion Team on Utilization of DOW Resources”, which has already completed the compilation for implementation project of the utilization and industrial development of DOW resources and the promotion of domestic DOW resources technology and industrial development in 2005, thus helping establish the R&D knowledge platform for utilization of DOW resources that offers domestic and overseas industries the technology information to drive related policy, hold seminar of exchange on policy of utilization of DOW resources and industrial promotion, issue news dispatch of DOW resources policy and industrial trends, convey the utilization of DOW resources by means of e-newspaper to members committed to industry-academy research, and propose “review operation on water-drawing construction project.” Moreover, WRA cooperated with ITRI in June 2006 to set up “DOW Resource Technology...
Development Research Center” to drive the R&D of DOW Industry technology in an attempt of producing rapid and comprehensive efficacy. The center is committed to planning the three missions about “promotion of policy on resources development,” “R&D of resource technology,” and “assistance in resource development technology service and industrial technology.”

(3) To establish DOW inspection technology, standard and accreditation system to thwart counterfeits or substandard counterparts, BSMI of MOEA entrusted Department of Harbor and River Engineering of Nat’l Taiwan Ocean University with the commissioned project titled “Draw-up of the Draft of National Standard on Inspection of DOW and Plan of Water Standard Evaluation” in March 2005. This project is set to compare and evaluate the regulations, standard and soecification methods governing DOW and water source by US, Japan and Taiwan, and meanwhile, samples from DOW are collected to verify and establish the draw-up of draft of national standard governing the water inspection methods.

(4) To assist the industries in product R&D, Industrial Development Bureau of MOEA has assigned The Biotechnology and Pharmaceutical Industries Program Office to cooperate with industrial, governmental, academic and research institutions to hold “DOW R&D Wrap-Up and Merchandization Presentation” on May 30, 2006, during which Nat’l Taiwan Ocean University, ITRI, Food Industry Research and Development Institute (FIRDI), Fisheries Research Institute (FRI), DOW Biotechnology Park under World Cement (BVI) Holding Corp., and Taiwan Fertilizer Corporation were invited to present their R&D wrap-ups, in the hopes of having exchange and intercommunication with biotechnology industries to apply DOW in cosmetics, drugs, healthy foods, and high-economic aquaculture.

(5) “National Aquaculture Biology Gene Bank - Project of Taitung Sub-Bank” under FRI of COA has been approved by Executive Yuan, setting to establish DOW-drawing and application facilities and establish the aquaculture biology genetic resources site and incubation or research center for agriculture and fishery in four years since 2006 in an attempt of carrying out applied experiment and research as well as offering part of raw water of DOW available for R&D by industries. The draw-up for application of DOW resources in delicate agriculture has been underway by COA, while Deputy Chief of Department of Technology has been assigned as the committee member to the Promotion Team.

(6) Yilan County Government has entrusted the Energy and Resources Laboratories of ITRI with the draw-up of “The Preliminary Planning of Feasibility for Use of Nan Ao Deep Ocean Water,” planning to carry out the issues concerning DOW drawing from waters in offshore of Nan Ao and the development of the industrial park. WRA further subsidizes a sum of budget at NT$5 million in 2006 to Yilan County Government in carrying out the survey into the environment in park of “utilization and industrial development of DOW resources,” park setup project, and the planning for BOT project.
A sum of subsidy at NT$1 million has been granted by WRA to Hualien County Government to carry out the 2006 promotional task of “utilization and industrial development of DOW resources.”

Taitung County Government has planned to draw up the construction of DOW biotechnology park, with this project already incorporated into the guidelines of policy for a further deliberation. Cooperating with private enterprises in carrying out this project, Taitung County Government set to exploit DOW to drive the economic development in eastern Taiwan. To carry out this project, BOT projects for “Major Facility and Ancillary Enterprises of DOW Tourism and Recreation Development” and “Major Industrial Facility and Ancillary Enterprises of DOW” have been underway which are bade by Kuo Toong International Co., Ltd. and Jing Cheng Co., Ltd. respectively, and the investment amount is estimated at about NT$3 billion in the development of DOW-related industries. WRA further subsidizes a sum of budget at NT$4 million in 2006 to Taitung County Government in carrying out the “utilization and industrial development of DOW resources.”

In the respect of private enterprise, in June 2005, “DOW Biotechnology Park” under World Cement (BVI) Holding Corp., subsidiary of Lucky Cement Corporation, has already completed the installation of 710m-depth experimental water-drawing pipeline in the offshore of San Chan River in Hsin Cheng Hsiang of Hualien, and further successfully achieved the operation of drawing DOW. The biotechnology park under World Cement (BVI) Holding Corp. also become a listed company on Sept. 27, 2005, and one product research center was further set up to seek technical assistance from resident laboratories. The total investment amount for the park is estimated at about NT$5 billion with its construction in the first phase centering on supplying the deep ocean water to domestic beverage market during which an estimate of NT$0.8 billion will be invested to construct the beverage water production plant, and the beverage products are slated to be on market later in 2006; an extra NT$0.9 billion will be invested in the production line for cosmetics making and brewing businesses. The center of emphasis in the third phase will feature the development of leisure and resorting park. DOW drawing pipeline available for production has been installed on May 6, 2006 in the park, with the water depth at 428m and water-drawing volume at 6000 m³/day (a maximum at 11,000CMD), thus making the pipeline with the maximum water-drawing volume in Taiwan.

“DOW development project” under Taiwan Fertilizer Company Limited (an estimated investment amount at about NT$5 billion) will be initiated with its completion of installation of water-drawing pipeline in July 2006 that makes the land-based water-drawing volume reaching at about 2000 m³/day, while subsequent water division/making process experiment will seek out the technology cooperation with resident laboratories. The investment amount for
the first phase of the project is estimated about at NT$1 billion which will be centered on the development of the industrial park that includes water-drawing construction, water treatment construction, and packaged drinking water. Taiwan Fertilizer has been consulted with Y.E.S. Mineral Water for further discussion and negotiation in future cooperation. Aqua-cultural, cosmetics making, beer brewing, food processing, and ocean-therapy SPA businesses will be the centers of emphasis in the second phase of the project, and Taiwan Fertilizer will keep to the development of the park. The development in the third phase will center on the construction of tourism and leisure facilities, while it will be in line with the “Hui Lan 2010 Sustainable Project” by Hualien County Government to develop the highly-unique leisure park.

(11)In Jan. 2006, Kung Long Enterprise Co., Ltd. successfully fulfilled its preliminary mission by drawing deep ocean water, and the future target undertaking will be centered on aqua-cultural business, while the total investment amount is estimated at NT$1.2 billion and the undertaking has been listed among the major investment projects by Hualien County Government.

7. Conclusion

Deep ocean water is one resource, basically, which is utilized to get the value added to commodities and have them introduced on market services that make it a DOW industry. In overall, course of value added for DOW industry starts from exploitation (water drawing) and delivery of resources, utilization of raw water, raw material to divide fresh and concentrated water and treatment, application by manufacturing industry, to value add by service industry to consumers. Most of the industries with such application have already existed in Taiwan, thus putting it in the way that the course of value added has been existed in Taiwan but not that applied in DOW resources. Only “occurrence of fact for exploitation of resources” and “existence of high value added application technology” can the DOW industry be launched instantly. In the respect of policy, however, the role played by government in expediting this industry is “touch offing the formation of industry” and “building the excellent environment for industrial development,” as the former one set to make a breakthrough of “occurrence of fact for exploitation of resources” and “existence of high value added application technology” that advances two strategies of “expediting the establishment of DOW park or facilities to draw or supply water” and “expediting the infrastructural research on the characteristics of DOW, and the technological R&D”; In the respect of “building the excellent environment for industrial development,” three strategies that “setup of inspection and accreditation systems to thwart counterfeits or substandard counterparts,” “incubation, innovation guidance and support of development of markets” and “review of amendment of regulations, incentive and promotional measures, and nurture industrial development” are practiced to achieve this goal, while the two major orientations will be driven by “Inter-Department-based Promotion Team on Utilization and Industrial Development of DOW Resources,” thus making civilian consumers to feel relieved of using the related products. In the light of
great market demand, traders will be committed to investment to bring consumers the brand new quality products and services; upon a use of those commodities and enjoyment of assessing those services as well as gaining in-depth insight into the advantages from DOW, it will give rise to consumers’ acceptability and demand that would further result in lowering the cost and purchase price and lead the products to their popularization.

MOEA will make use of Taiwan’s DOW resources to integrate the existing technical abilities of the traditional industries by taking “the coordination of policy with promotion, resource development, application technology R&D, product accreditation, industrial incubation, promotion of marketing” to build the industrial value chain of DOW resources, in the hopes of advancing the formation of Taiwan’s characteristic industries and enhancing the international competitiveness for this industry.

Reference

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